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EXAMINER	
PHAN, HANH	

ART UNIT	PAPER NUMBER
2638	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/820,529	NAGEL, JONATHAN A.	
	Examiner	Art Unit	
	Hanh Phan	2638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,10-22 and 26-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,10-22 and 26-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is responsive to the Amendment filed on 12/12/2005.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 10-15 and 26-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

-Claim 10 recites the limitation "**the ratio L1/L2**" in line 3. There is insufficient antecedent basis for this limitation in the claim.

-Claim 13 recites the limitation "**the ratio Ψ1/Ψ2**" in line 3. There is insufficient antecedent basis for this limitation in the claim.

-Claim 26 recites the limitation "**the ratio L1/L2**" in line 3. There is insufficient antecedent basis for this limitation in the claim.

-Claim 29 recites the limitation "**the ratio Ψ1/Ψ2**" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Penninckx et al (US Patent No. 6,710,904).

Regarding claims 1 and 17, referring to Figure 2, Penninckx teaches an optical communication system that compensates for polarization mode dispersion (PMD), comprising:

an optical source (i.e., optical transmitters TX, Fig. 2) that transmits two or more optical signals having different optical frequency bands; and

a first optical compensator (i.e., optical PMD compensators CMs, Fig. 2) that receives the two or more optical signals and rotating at least one polarization state of the two or more optical signals based on an error condition to compensate for PMD (col. 6, lines 8-64 and col. 7, lines 15-60).

6. Claims 1 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Bruyere et al (US Patent No. 6,178,021).

Regarding claims 1 and 17, referring to Figures 1A, 1B and 2-4, Bruyere teaches an optical communication system that compensates for polarization mode dispersion (PMD), comprising:

an optical source (i.e., optical transmitters Tx, Fig. 1B) that transmits two or more optical signals having different optical frequency bands; and

a first optical compensator (i.e., optical PMD compensator CDP, Fig. 1B) that receives the two or more optical signals and rotating at least one polarization state of the two or more optical signals based on an error condition to compensate for PMD (from col. 3, line 56 to col. 6, line 62).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 2-6, 10-15, 18-22 and 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Penninckx et al (US Patent No. 6,710,904) in view of Way et al (US Patent No. 6,583,903).

Regarding claims 2 and 18, Penninckx differs from claims 2 and 18 in that he fails to specifically teach a first birefringent optical conduit that receives the rotated optical signals and disperses the rotated optical signals; and an optical receiver that receives the dispersed optical signals, wherein the receiver measures the error condition of at least a first dispersed optical signal of the dispersed optical signals; wherein the optical compensator adjusts the PMD of at least the first dispersed optical signal by changed the polarization state of rotation based on the error condition to compensate for PMD . However, Way in US Patent No. 6,583,903 teaches a first birefringent optical conduit that receives the rotated optical signals and disperses the

rotated optical signals; and an optical receiver that receives the dispersed optical signals, wherein the receiver measures the error condition of at least a first dispersed optical signal of the dispersed optical signals; wherein the optical compensator adjusts the PMD of at least the first dispersed optical signal by changed the polarization state of rotation based on the error condition to compensate for PMD (Figure. 10, col. 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the first birefringent optical conduit that receives the rotated optical signals and disperses the rotated optical signals; and an optical receiver that receives the dispersed optical signals, wherein the receiver measures the error condition of at least a first dispersed optical signal of the dispersed optical signals; wherein the optical compensator adjusts the PMD of at least the first dispersed optical signal by changed the polarization state of rotation based on the error condition to compensate for PMD as taught by Way in the system of Penninckx. One of ordinary skill in the art would have been motivated to do this since Way suggests in column 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50 that using such the first birefringent optical conduit that receives the rotated optical signals and disperses the rotated optical signals; and an optical receiver that receives the dispersed optical signals, wherein the receiver measures the error condition of at least a first dispersed optical signal of the dispersed optical signals; wherein the optical compensator adjusts the PMD of at least the first dispersed optical signal by changed the polarization state of rotation based on the error condition to compensate for PMD

have advantage of allowing compensating polarization mode dispersion of the signal, reducing the signal error and improving the quality of the signal.

Regarding claims 3, 4, 19 and 20, the combination of Penninckx and Way teaches wherein the error condition is based on a number of bit errors of the first received signal (Fig. 10 of Way, col. 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50).

Regarding claims 5 and 21, the combination of Penninckx and Way teaches the error condition is based on PMD of the first received signal (Fig. 2 of Penninckx).

Regarding claims 6 and 22, the combination of Penninckx and Way teaches wherein the first optical compensator is a single rotation device that rotates the polarization of each the two or more optical signals (Fig. 10 of Way, col. 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50).

Regarding claims 10-12 and 26-28, the combination of Penninckx and Way teaches the first optical compensator is positioned at a location between the optical source and the optical receiver and defined by the ratio L1/L2 and wherein L1/L2 is less than approximately 1.5, and wherein L1 is the length of a first optical conduit between the optical compensator and optical source, and L2 is the length of the second optical conduit between the optical compensator and optical receiver (see Fig. 10 of Way and Fig. 2 of Penninckx).

Regarding claims 13-15 and 29-31, the combination of Penninckx and Way teaches the first optical compensator is positioned at a location between the optical source and the optical receiver and defined by the ratio $\Psi 1/\Psi 2$ and wherein $\Psi 1/\Psi 2$ is

less than approximately 1.2, and wherein $\Psi 1$ is the average PMD of a first optical conduit between the optical compensator and optical source, and $\Psi 2$ is average of the second optical conduit between the optical compensator and optical receiver (see Fig. 10 of Way and Fig. 2 of Penninckx).

9. Claims 2-6, 10-16, 18-22 and 26-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruyere et al (US Patent No. 6,178,021) in view of Way et al (US Patent No. 6,583,903).

Regarding claims 2 and 18, Buyere differs from claims 2 and 18 in that he fails to specifically teach a first birefringent optical conduit that receives the rotated optical signals and disperses the rotated optical signals; and an optical receiver that receives the dispersed optical signals, wherein the receiver measures the error condition of at least a first dispersed optical signal of the dispersed optical signals; wherein the optical compensator adjusts the PMD of at least the first dispersed optical signal by changed the polarization state of rotation based on the error condition to compensate for PMD . However, Way in US Patent No. 6,583,903 teaches a first birefringent optical conduit that receives the rotated optical signals and disperses the rotated optical signals; and an optical receiver that receives the dispersed optical signals, wherein the receiver measures the error condition of at least a first dispersed optical signal of the dispersed optical signals; wherein the optical compensator adjusts the PMD of at least the first dispersed optical signal by changed the polarization state of rotation based on the error condition to compensate for PMD (Figure. 10, col. 8, lines 48-67, col. 9, lines 1-67 and

col. 10, lines 1-50). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the first birefringent optical conduit that receives the rotated optical signals and disperses the rotated optical signals; and an optical receiver that receives the dispersed optical signals, wherein the receiver measures the error condition of at least a first dispersed optical signal of the dispersed optical signals; wherein the optical compensator adjusts the PMD of at least the first dispersed optical signal by changed the polarization state of rotation based on the error condition to compensate for PMD as taught by Way in the system of Buyere. One of ordinary skill in the art would have been motivated to do this since Way suggests in column 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50 that using such the first birefringent optical conduit that receives the rotated optical signals and disperses the rotated optical signals; and an optical receiver that receives the dispersed optical signals, wherein the receiver measures the error condition of at least a first dispersed optical signal of the dispersed optical signals; wherein the optical compensator adjusts the PMD of at least the first dispersed optical signal by changed the polarization state of rotation based on the error condition to compensate for PMD have advantage of allowing compensating polarization mode dispersion of the signal, reducing the signal error and improving the quality of the signal.

Regarding claims 3, 4, 19 and 20, the combination of Buyere and Way teaches wherein the error condition is based on a number of bit errors of the first received signal (Fig. 10 of Way, col. 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50).

Regarding claims 5 and 21, the combination of Buyere and Way teaches the error condition is based on PMD of the first received signal (Fig. 2 of Buyere).

Regarding claims 6 and 22, the combination of Buyere and Way teaches wherein the first optical compensator is a single rotation device that rotates the polarization of each the two or more optical signals (Fig. 10 of Way, col. 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50).

Regarding claims 10-12 and 26-28, the combination of Buyere and Way teaches the first optical compensator is positioned at a location between the optical source and the optical receiver and defined by the ratio L1/L2 and wherein L1/L2 is less than approximately 1.5, and wherein L1 is the length of a first optical conduit between the optical compensator and optical source, and L2 is the length of the second optical conduit between the optical compensator and optical receiver (see Fig. 10 of Way and Fig. 2 of Buyere).

Regarding claims 13-15 and 29-31, the combination of Buyere and Way teaches the first optical compensator is positioned at a location between the optical source and the optical receiver and defined by the ratio $\Psi 1/\Psi 2$ and wherein $\Psi 1/\Psi 2$ is less than approximately 1.2, and wherein $\Psi 1$ is the average PMD of a first optical conduit between the optical compensator and optical source, and $\Psi 2$ is average of the second optical conduit between the optical compensator and optical receiver (see Fig. 10 of Way and Fig. 2 of Buyere).

Regarding claims 16 and 32, the combination of Buyere and Way teaches a second optical PMD compensator (Figures. 2-4 of Buyere, and from col. 3, line 56 to col. 6, line 62).

10. Claims 16 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Penninckx et al (US Patent No. 6,710,904) in view of Way et al (US Patent No. 6,583,903) and further in view of Bruyere et al (US Patent No. 6,178,021).

Regarding claims 16 and 32, Penninckx as modified by Way teaches all the aspects of the claimed invention except fails to teach a second optical PMD compensator. However, Bruyere in US Patent No. 6,178,021 teaches a second PMD compensator for compensating the polarization mode dispersion of the signal (Figures. 2-4, and from col. 3, line 56 to col. 6, line 62). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the second PMD compensator for compensating the polarization mode dispersion of the signal as taught by Bruyere in the system of Penninckx modified by Way. One of ordinary skill in the art would have been motivated to do this since Bruyere suggests in from column 3, line 56 to col. 6, line 62 that using such the second PMD compensator for compensating the polarization mode dispersion of the signal and wherein the error condition is based on PMD of the first received signal have advantage of allowing compensating polarization mode dispersion of the signal, reducing the signal error and improving the quality of the signal.

11. Claims 1-4, 6, 17-20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robinson et al (US Patent No. 6,404,520) in view of Way et al (US Patent No. 6,583,903).

Regarding claims 1 and 17, referring to Figure 3, Robinson teaches an optical communication system that compensates for polarization mode dispersion (PMD), comprising:

an optical source (i.e., optical source 24, Fig. 3) that transmits two or more optical signals having different optical frequency bands; and

a first optical compensator (i.e., optical compensator PMDC 32, Fig. 3) that receives the two or more optical signals (col. 4, lines 44-67, col. 5, lines 1-63 and col. 6, lines 28-50).

Robinson differs from claims 1 and 17 in that he fails to specifically teach rotating at least one polarization state of the two or more optical signals based on an error condition to compensate for PMD. However, Way in US Patent No. 6,583,903 teaches rotating at least one polarization state of the two or more optical signals based on an error condition to compensate for PMD (Figure. 10, col. 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the rotating at least one polarization state of the two or more optical signals based on an error condition to compensate for PMD as taught by Way in the system of Robinson. One of ordinary skill in the art would have been motivated to do this since Way suggests in column 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50 that using such the rotating at least one

polarization state of the two or more optical signals based on an error condition have advantage of allowing compensating polarization mode dispersion of the signal, reducing the signal error and improving the quality of the signal.

Regarding claims 2 and 18, the combination of Robinson and Way teaches further comprising:

a first birefringent optical conduit that receives the rotated optical signals and disperses the rotated optical signals; and

an optical receiver that receives the dispersed optical signals, wherein the receiver measures the error condition of at least a first dispersed optical signal of the dispersed optical signals;

wherein the optical compensator adjusts the PMD of at least the first dispersed optical signal by changed the polarization state of rotation based on the error condition to compensate for PMD (Fig. 10 of Way, col. 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50).

Regarding claims 3, 4, 19 and 20, the combination of Robinson and Way teaches wherein the error condition is based on a number of bit errors of the first received signal (Fig. 10 of Way, col. 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50).

Regarding claims 6 and 22, the combination of Robinson and Way teaches wherein the first optical compensator is a single rotation device that rotates the polarization of each the two or more optical signals (Fig. 10 of Way, col. 8, lines 48-67, col. 9, lines 1-67 and col. 10, lines 1-50).

12. Claims 5, 13-15, 21 and 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robinson et al (US Patent No. 6,404,520) in view of Way et al (US Patent No. 6,583,903) and further in view of Penninckx et al (US Patent No. 6,710,904).

Regarding claims 5 and 21, Robinson as modified by Way teaches all the aspects of the claimed invention except fails to teach the error condition is based on PMD of the first received signal. However, Penninckx in US Patent No. 6,710,904 teaches a PMD compensator for compensating the polarization mode dispersion of the signal and wherein the error condition is based on PMD of the first received signal (Figure. 2, col. 6, lines 8-67 and col. 7, lines 15-60). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the PMD compensator for compensating the polarization mode dispersion of the signal and wherein the error condition is based on PMD of the first received signal as taught by Penninckx in the system of Robinson modified by Way. One of ordinary skill in the art would have been motivated to do this since Penninckx suggests in column 6, lines 8-67 and col. 7, lines 15-60 that using such the PMD compensator for compensating the polarization mode dispersion of the signal and wherein the error condition is based on PMD of the first received signal have advantage of allowing compensating polarization mode dispersion of the signal, reducing the signal error and improving the quality of the signal.

Regarding claims 10-12 and 26-28, the combination of Robinson, Way and Penninckx teaches the first optical compensator is positioned at a location between the optical source and the optical receiver and defined by the ratio L1/L2 and wherein L1/L2

is less than approximately 1.5, and wherein L1 is the length of a first optical conduit between the optical compensator and optical source, and L2 is the length of the second optical conduit between the optical compensator and optical receiver (see col. 5 of Robinson, lines 19-26 and see Fig. 10 of Way and Fig. 2 of Penninckx).

Regarding claims 13-15 and 29-31, the combination of Robinson, Way and Penninckx teaches the first optical compensator is positioned at a location between the optical source and the optical receiver and defined by the ratio $\Psi 1/\Psi 2$ and wherein $\Psi 1/\Psi 2$ is less than approximately 1.2, and wherein $\Psi 1$ is the average PMD of a first optical conduit between the optical compensator and optical source, and $\Psi 2$ is average of the second optical conduit between the optical compensator and optical receiver (see col. 5 of Robinson, lines 19-26 and see Fig. 10 of Way and Fig. 2 of Penninckx).

13. Claims 16 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robinson et al (US Patent No. 6,404,520) in view of Way et al (US Patent No. 6,583,903) and further in view of Bruyere et al (US Patent No. 6,178,021).

Regarding claims 16 and 32, Robinson as modified by Way teaches all the aspects of the claimed invention except fails to teach a second optical PMD compensator. However, Bruyere in US Patent No. 6,178,021 teaches a second PMD compensator for compensating the polarization mode dispersion of the signal (Figures. 2-4, and from col. 3, line 56 to col. 6, line 62). Therefore, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the second PMD compensator for compensating the polarization mode dispersion of the signal as

taught by Bruyere in the system of Robinson modified by Way. One of ordinary skill in the art would have been motivated to do this since Bruyere suggests in from column 3, line 56 to col. 6, line 62 that using such the second PMD compensator for compensating the polarization mode dispersion of the signal and wherein the error condition is based on PMD of the first received signal have advantage of allowing compensating polarization mode dispersion of the signal, reducing the signal error and improving the quality of the signal.

Response to Arguments

14. Applicant's arguments with respect to claims 1-6, 10-22 and 26-32 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh Phan whose telephone number is (571)272-3035.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached on (571)272-3022. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

HANH PHAN
PRIMARY EXAMINER